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ABSTRACT

As attention becomes increasingly focused on distance education in the public eye and within the academic community, a sense of urgency to develop online course offerings is taking hold among institutions that wish to be responsive to student needs (real or perceived) and that do not want to be "left behind" as peer institutions tool up for distance instruction. With the host of software tools available, adapting courses to the on-line learning environment does not pose insurmountable technical obstacles, and can be almost routine. What becomes a challenge is preserving the original value of the instructional design and adapting the pedagogical nuances of a course to best leverage the modalities of on-line instruction. This paper illustrates how a graduate level course at Teachers College, Columbia University, tailored for face-to-face instruction, was adapted for distant learners, and how the instructional design was captured and replicated by a Web-based distance education authoring tool. (Author)

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CourseMaster: Modeling A Pedagogy for On-line Distance Instruction

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Abstract: As attention becomes increasingly focused on distance education, in the public eye and within the academic community, a sense of urgency to develop on-line course offerings is taking hold among institutions that wish to be responsive to student needs (real or perceived) and that do not want to be "left behind" as peer institutions tool up for distance instruction. With the host of software tools available, adapting courses to the on-line learning environment does not pose insurmountable technical obstacles, and can be almost routine. What becomes a challenge is preserving the original value of the instructional design and adapting the pedagogical nuances of a course to best leverage the modalities of on-line instruction. This paper illustrates how a graduate level course at Teachers College, tailored for face-to-face instruction, was adapted for distant learners, and how the instructional design was captured and replicated by a web-based distance education authoring tool.

Introduction

Recently, Teachers College, Columbia University expanded the boundaries of its campus by offering on-line distance learning courses for the first time. Three graduate courses, in three different areas, were selected for this pilot initiative: Computer-Mediated Communication, The Teaching of Writing, and Instructional Design of Educational Technology. The courses, previously designed for the classroom, were adapted to on-line settings, and in the spirit of experimentation, each course adopted a different development path. We will discuss the design of the course in Instructional Design of Educational Technology, which poses several challenges to the distance format, among them, its emphasis on discussion, the importance of technology demonstrations, and the centrality of group project work. We also summarize the evolution of the CourseMaster Authoring Environment, a database-driven tool that is derived centrally from a model of distance instruction that guided the construction of the original course application.

Goals

The goals of this project were to build a reproducible distance learning model, within which rich classroom interactions among participants can be replicated, and to shed light on potential obstacles to the success of this approach. We were guided in part by our previous distance learning research that calls for a resource space, discussion space and collaboration space as components of successful computer-supported distributed learning (Bell & Meyer,1997). In the pilot course, we focussed on specific design techniques for fostering group interaction. We developed several facets of the course with community-building in mind: a student database where participants would share personal profiles; a suite of technology demonstrations and corresponding assignments aimed at getting students to share reactions to those demonstrations; a terminal project that engaged teams of students in remote collaboration; and regular discussion and chat sessions to foster and sustain whatever communal momentum had been achieved. The creation and implementation of Instructional Design Online (as the distance version came to be called) presented an opportunity to invent a web-based learning environment, adapt an onsite class to an on-line course and capture its design in a mold, thus providing a test-bed for studying learning at a distance.

Pilot Course Design: Instructional Design Online

Instructional Design of Educational Technology is a graduate class that surveys contemporary frameworks for intelligent learning environments and that engages students in designing and executing collaborative projects (e.g., an interactive web-based environment, stand-alone instructional multimedia, etc.). The class thus emphasizes learning by doing. In order to support this approach through computer-mediated instruction, the course site includes five sections, each of which can be reached

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by using a drop-down menu: *Information Desk*, *Course Central*, *Instructor's Corner*, *Student Lounge*, and *Help Center*. Each section has its own sub-menu for the sites located within that section.

The Information Desk includes an overview of the course, an orientation session, a course outline, and registration information. The overview offers a summary of the class and a list of required readings. The orientation is intended to welcome students, guide them into practicing tasks common to an on-line class and prepare them with the tools necessary for exploring the learning environment. Initial assignments are designed to engage students in Internet communication. Orientation assignments include viewing a video welcome from the instructors (Fig. 1) and creating a student profile.

Figure 1: Streamed Video Greeting

Course Central consists of a syllabus, on-line demonstrations of educational technology, course lecture slides, and course assignments. The syllabus is divided into topic-specific modules, each including links to the corresponding lecture slides, assignments for the week and related technology demonstrations. The readings for that module are available via hypertext links to external web sites.

Web-based educational technology demonstrations represent an important element of this course. The principles and frameworks discussed in the readings can remain largely static or abstract in the absence of applications of those ideas in the form of interactive illustrations. To preserve this central aspect of the course, we adapted several works-in-progress at Teachers College for on-line viewing, including Wx-Brief (Bell, Vaughn & Reibel 1997), Aviation Story Archive (Bell, Gold & Kaplan, 1998), and the Virtual Hall of Fame (Zirkel, Bell & Gold, 1998). Each Demonstration is accessible on-line (Fig. 2) and supplemented by an assignment in which students share observations and critiques of the demonstration.

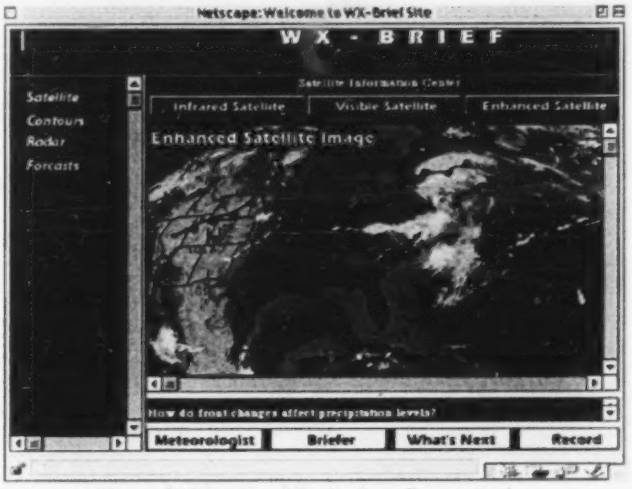

Figure 2: Educational Technology Demonstration

Lecture Slides are available in modules, each consisting of slides that can be navigated in succession or through direct links. Assignments are designed to encourage students to explore technology tools and Instructional Design theories, and to integrate them in discussion responses and project creations. Assignments range from regular responses to issues raised in the reading to creating interactive exemplars of concepts treated during the course.

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The Student Lounge includes a database of student profiles, a meeting room and a student projects area. The Student Profiles section facilitates the distribution and sharing of individual profile and contact information. A participant database (Fig. 3) receives profile forms submitted by the student, and permits the browsing and searching of participant profiles, pictures and contact data. Profiles include direct links to student mailboxes and world wide web addresses, personal interests, and academic and professional histories. The instructors' profiles and office hours are in the Instructors' Corner. The profiles include Instructor academic background, links to personal web sites, and office hours (which are conducted face-to-face, by telephone, via text chat, or using audio conferencing).

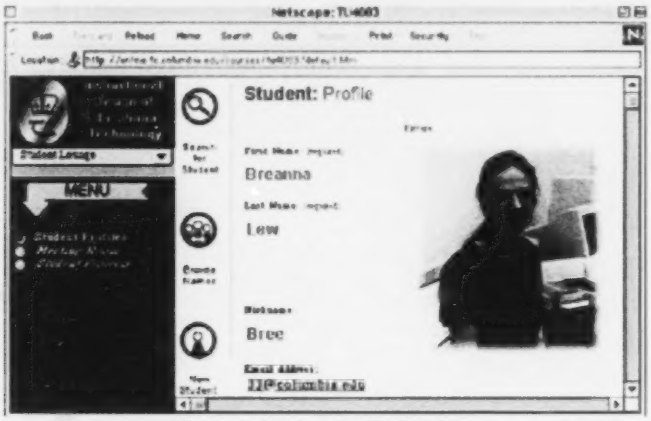

Figure 3: Student Profile Database

The Meeting Room, supporting synchronous (chat) and asynchronous (bulletin board) interaction, is the primary communication area. The chat room permits live scheduled group discussions, including multiple simultaneous one-to-one private chats, about topics related to course content, assignments and group projects. Class-wide chats are transcribed and published on the course site. The discussion room supports group communication through individual message postings.

Early in the course, students are asked to form groups and to begin proposing final projects. As the semester progresses, students are asked to prepare incremental reports, such as a storyboard, documenting their progress in the final project. The Student Projects area centralizes information regarding final projects, the culminating product of the students' experience in the course. Suggestions (in the form of online technology demonstrations) are offered as potential group projects, though students are invited to propose their own ideas as well. A project database collects and publishes information about project group members, member email addresses, and project URLs, so that group members and projects are easily accessible.

Formative Evaluation

Participants

The course was offered during the spring, summer and fall semesters of 1998 and is currently in session for the spring, 1999 term. Eight students enrolled for the spring semester, 7 students for the summer, and 17 for the fall. In each semester's class, more than half of the students registered for credit. All of the students in each semester had completed or were pursuing either a Masters or Doctoral degree. Most of the students registered for credit were part-time students who work full-time as either classroom teachers or technology professionals. Several of the non-credit students were faculty at other institutions who were interested in exploring examples of distance learning courses. Students were physically situated in locations throughout the U.S. (with some international participation from Japan and Brazil).

Methods

Pre- and post-course surveys and scheduled chat interviews were used to gather qualitative information about on-line students and on-line student experiences in the pilot course. Chat sessions, discussion postings and group projects served as additional evidence documenting student performance. The objective of this formative evaluation was to learn more about how students made use of the tools we supplied with the course, the extent to which those tools furthered the students' capacity to engage in the class activities, and to explore potential research questions for further studies. The study did not attempt to measure learning outcomes beyond a qualitative assessment of their productivity as required for grading purposes. Our evaluation was guided in part by the expectation that understanding the learning needs of students is crucial to successful on-line course experiences (Reid, 1996; Warren, 1996; Willis, 1995). Pre-course surveys were aimed at gauging student backgrounds and skills and their reasons for enrolling in the course. Post-course surveys were aimed at gathering student perceptions about their experience in the course and the design of the learning environment.

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Results

Computing ability and exposure to the Internet varied widely among incoming students. In each class there were individuals who reported that they did not feel confident in their computing skills, as well as others who reported that they were comfortable with a variety of computer and Internet applications. Variation in computer literacy also became evident as the semesters progressed. Many of the individuals who had expressed a lack in computing skills moved through the syllabus at a much slower rate and seemed to be less involved in group communication. There were also individuals who came in with weak computing skills and gained proficiency at a rapid rate. During one semester, a vision-impaired student participating in the course provided valuable feedback on the extent to which our course site accommodates visually-impaired students in accessing information and navigating the site.

The Discussion room was the most active component of the courses in each semester, primarily used for discussion about course assignments and scheduling. Assignment postings took on a quality that seemed to be a cross between written language and spoken conversation, with ideas expressed in a blending of informal and formal language styles. A large proportion of the postings in the discussion threads were responses to assignments or questions from the Instructor or Teaching Assistant. Students did not begin to initiate spontaneous postings until later in the semester. The discussion room was not used for dialog with other students until the Instructor suggested that students respond to the postings of other students. Once this suggestion was made, peer-to-peer interaction became more frequent and substantive.

Statements from students indicate that communication among students also took place via private email messages and by telephone. While much of the communication from the Instructor and Teaching Assistant occurred in the public communication space, spontaneous communication from students to instructors usually took place in private email or telephone messages. Email messages and telephone calls from students to the Instructor or TA were primarily about administrative and technical issues, such as course credit, and only occasionally contained content related communication. Instances of project related mail and phone calls did occur just before the final projects were due during the spring and summer semesters.

Students in the spring and summer semesters did not frequently meet in the Chat Room unless the Instructor had scheduled the chat. Students in the fall course appeared to be making more use of the Chat Room for peer-to-peer communication. One fall semester group met in the Chat Room for several hours a week. The main differences between groups in the fall course and groups in the spring and summer appeared to be group size (the fall class had larger groups) and individual computing ability (the fall class had more individuals with strong computing ability). In each term, the Chat Room was used on just one occasion as an entire class (time-zone differences caused scheduling difficulties). Not all of the students attended the scheduled chats. For the participants who did attend, these sessions were productive. Several students mentioned that Chat Room discussions were most like the communication that takes place in the classroom. All of the Chat participants spontaneously shared thoughts and ideas.

Not all of the individuals in the spring and summer courses completed a final group project. The group projects that were completed were of high quality. There had been some concern about whether students in the on-line class would have access to the same materials as students in the classroom, such as commercial, licensed authoring software, so it was decided that on-line student projects would be created with publicly available materials. Despite the potential difference in student resources, the on-line students' final project was comparable to final projects created by students in the classroom. Students in both online and in classroom courses produced original technology-based learning environments that showed some integration of theories discussed in the course.

Student comments suggested that they appreciated the variety of delivery methods and information resources provided, such as lecture notes, public readings and discussion threads. However, they also expressed frustration in accessing these resources. Several students mentioned that they had consistently had connectivity problems and problems during chat sessions and in downloading plug-ins and other course information. Advanced components took too long to download or made their computer crash. These students indicated that much of the problem was with their hardware. Suggestions were made to make graphics, video and other hard to access information available through other means. Generally, the comments acknowledged the importance of speedy and reliable connections and up-to-date hardware. Also, based on the comments made during the final chat session in which students were directly queried (in the absence of the instructor), students appeared overwhelmed by the technical requirements combined with the content of the course. These students did not feel that their knowledge of computer technology supported their learning needs and suggested a hands-on prerequisite, which would enable students to learn the technology apart from the content. All students who have completed the course thus far responded that they would consider taking another distance learning course.

Discussion

Our exploratory findings provide some information about the needs of distance learners, how our design functions in practice, and how to focus our future research efforts. While many distance courses are promoted to provide flexibility and convenience, they may in fact be more time consuming than classroom courses, depending upon the skill level and resources of individual participants and the quantity of participants. For students who were not comfortable with Internet communication or had inadequate resources, downloading data and keeping up with communication was more time consuming than they had expected. It is clear when examining both student needs and instructional design that explicit information regarding minimum and suggested hardware and software requirements be made available to students.

There appear to be both similarities and differences in student participation in classroom and distance learning environments. Similarly to on-site classes, students who were not taking the course for credit were not as active as students who were enrolled for credit. In contrast to on-site classes, students in the on-line class did not seem as accountable for their work. On-line students did not complete all of the assignments and did not attend all the scheduled meetings. Overall, the on-line students in this class required more guidance and imperatives. On-line students did not seem as self-disciplined, perhaps because they did not have physical access to the Instructor or Teaching Assistant. Despite the challenges involved in this on-line setting, students were able to utilize the tools, navigate and participate within the learning environment. Most students more than sufficiently completed the entire course on-line.

These preliminary studies have been helpful in our efforts to develop more systematic means of investigation. Based on student comments and student participation in the spring and summer courses, a new set of database-driven pre-course and post-course surveys was developed and distributed in the fall semester online and classroom courses. Survey questions are designed to capture information regarding student skill level, reasons for taking the course, predictions about the learning outcomes and challenges in on-line courses versus the learning outcomes and challenges of students in classroom courses, and perceptions of student-professor and student-student relationships. Questions in the new surveys invite both open-ended (as in previous surveys) answers and precalculated answers (based on open-ended answers from previous semesters). The overall goal of this new addition to the design of the course is to provide an improved structure for examining on-line student learning, evaluating course design, discovering student perceptions about on-line learning in comparison to classroom learning and gathering preliminary evidence about whether or not intimacy levels among individuals within a distance learning environment are different than intimacy levels among students in a classroom environment.

Bringing the Model to Life

Upon building what proved to be an effective course design given current technological conditions, we then successfully crafted CourseMaster (Fig. 4) by abstracting the original course and implementing that abstracted model as a set of relationally-linked database templates. The result is a sophisticated courseware authoring tool that not only renders the course production process less mechanically burdensome, but also adheres to (and derives its power from) this specific design model. Because it is created in a fully web-compliant database environment, CourseMaster can be used remotely by authors, and design commitments are immediately reflected in the materials published on the web. We can now create a new on-line course modeled on this design, within any subject area, with relative ease.

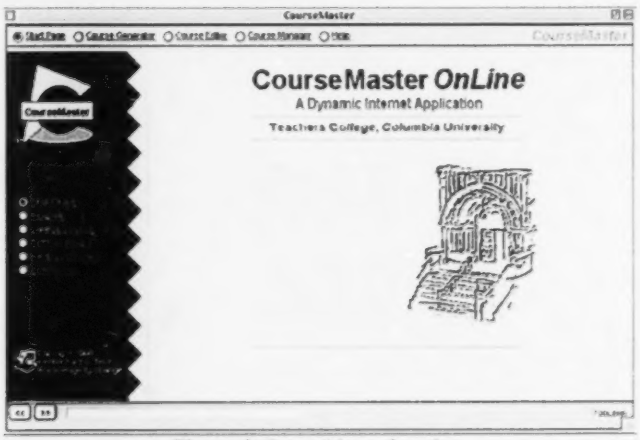

Figure 4: CourseMaster Interface

CourseMaster presents us with three research opportunities. First, comparisons can be made using the same design among different content areas. Second, aspects of group interaction across all content areas and design frameworks can be explored with the use of survey evaluation databases. Third, questions can be asked about instructional design in terms of particular on-line learning components, such as chats, discussion rooms and visual aids, by building identical courses that vary only in terms of the use of particular components.

Conclusion

One common deficiency among distance instruction materials we have encountered is the absence of an explicit instructional approach (Bell & Meyer, 1997). This paper described a distance courseware design in which we adopted a pedagogy that emphasizes peer interaction and group collaboration. An overall objective of this research is to develop frameworks for distance course design, appropriate for given subject domains, that preserve the positive elements of face-to-face

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instructional designs while introducing new strategies that take advantage of the properties of desktop telecommunication and web-based interchange. Our experiences with the design of Instructional Design Online have suggested some positive aspects of on-line distance learning and have indicated some directions for future research and course development. A principal conclusion is that successful distance learning must be at least as (if not more) firmly grounded in communication as traditional classroom instruction. Our success with the use of student profiles, collaborative project work, and extensive discussion lend supports to the claim that distance learning is effective to the degree that it creates and maintains learning communities that support knowledge construction. The emergence of collaborative tools that allow students to create and refine knowledge artifacts on-line is encouraging (Harasim, Calvert & Groeneboer, 1996). Web-based communications technologies will no doubt continue to evolve to support more real time communication and a more seamless interface among communication, collaboration, and information-gathering resources (Harasim, 1990). Flexible tools, such as CourseMaster, that help course designers to organize their information and incorporate emerging communication and collaborative learning tools support an extension beyond the current model of an HTML template for didactic presentation, toward virtual communities of learning.

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